

Assignment of *Acanthopagrus* populations in the Persian Gulf drainage system of Iran to *Acanthopagrus arabicus* Iwatsuki, 2013 (Perciformes: Sparidae)

Hamid Reza ESMAEILI*, Mojtaba MASOUDI, Hamid Reza MEHRABAN

¹Department of Biology, College of Sciences, Shiraz University, Shiraz, Iran.
Email: hresmaeili22@gmail.com

Abstract: The distribution of yellowfin seabream populations in estuaries and inland rivers in coastal area of the Persian Gulf and Strait of Hormuz is presented. Based on morphological and mersitic characteristics and also color pattern, these populations are assigned to the recently described sparid fish, *Acanthopagrus arabicus* Iwatsuki, 2013 which is distinguished by pelvic and anal fins vivid or strong yellow; black streaks proximally on inter-radial membranes between yellow anal-fin rays absent; lower caudal-fin lobe yellow; clear black blotches usually absent just beneath inter-radial membranes between dorsal-fin rays but upper dorsal-fin membrane often with darker margin; weak diffuse dark blotch at origin of lateral line, usually covering first pored lateral-line scale, continuing as a dense dark shading over upper part of posterior opercle.

Keywords: Yellowfin seabream, Distribution, Persian Gulf, Iran.

Introduction

The sea breams or porgies (Sparidae) are found in shallow temperate and tropical waters of the Atlantic, Indian and Pacific oceans and comprise about 36 genera and about 130 species (Eschmeyer and Fong 2011). The yellowfin seabream, *Acanthopagrus latus* (Houttuyn, 1782) is a member of this family. Widely distributed populations of this species have been considered as a single, valid Indo-West Pacific Ocean species for a long time, characterized by having yellow pelvic, anal and caudal fins. However, its taxonomic position has been recently reviewed (Iwatsuki 2013) and this complex species group has been separated into 5 valid species based on morphological and molecular characteristics: *Acanthopagrus latus* (east Asian shelf), *Acanthopagrus longispinnis* (Bengal Bay), *Acanthopagrus morrisoni* (north-western Australia), *Acanthopagrus arabicus* (Middle East, except for the Red Sea to coasts of Iran and Pakistan, and western Indian coast) and *Acanthopagrus sheim* (Hawar Islands, Qatar, Persian Gulf) increase the number of

valid species of the genus *Acanthopagrus* to 20 species (see Iwatsuki 2013).

Different populations of the only species of genus *Acanthopagrus* in Tigris River and Persian Gulf basins of Iran have been considered as *Acanthopagrus latus* (Esmaili et al. 2010, Coad 2014). Based on the recent work of Iwatsuki (2013), these populations cannot be assigned to *A. latus* which is restricted to East Asian shelf. Our findings confirm assignment of some populations to the recently described species, *Acanthopagrus arabicus* Iwatsuki, 2013.

Material and Methods

Acanthopagrus specimens were collected during fieldwork on the ichthyofauna of southern Iran from: I) Shur River, Hormuzgan Basin at the Strait of Hormuz (27°17'43.14"N, 56°29'15.4"E; Alt. 16 m, ZM-CBSU137, 1, 84.35 mm SL, 12 March 2013), II) Dargahan, Qeshm Island, Persian Gulf, (26° 58' 27.4"N, 56° 05' 00.3"E, ZM-CBSU k1658, 1, 183.8 mm SL, 08 Feb. 2014), and III) Toola, Qeshm



Fig.1. Distribution map of previous (circle) and present (square, Shur River; triangle, Qeshm, Persian Gulf) recorded *Acanthopagrus* populations in Coastal area of Persian Gulf and Strait of Hormuz (Source of map, Google earth, 2014).



Fig.2. *Acanthopagrus arabicus* from Shur River, South-East Iran at Strait of Hormuz

Island, Persian Gulf (26° 59' 46.2"N, 56° 03' 26.2"E, ZM-CBSU k1652-k1657, 6, 159-196 mm SL, 09 Feb. 2014) (Fig. 1). The specimens were photographed immediately after being captured by a high quality digital camera in a portable aquarium (Figs. 2, 3). After anesthesia, fin clips were removed and fixed in 96% ethanol for further molecular

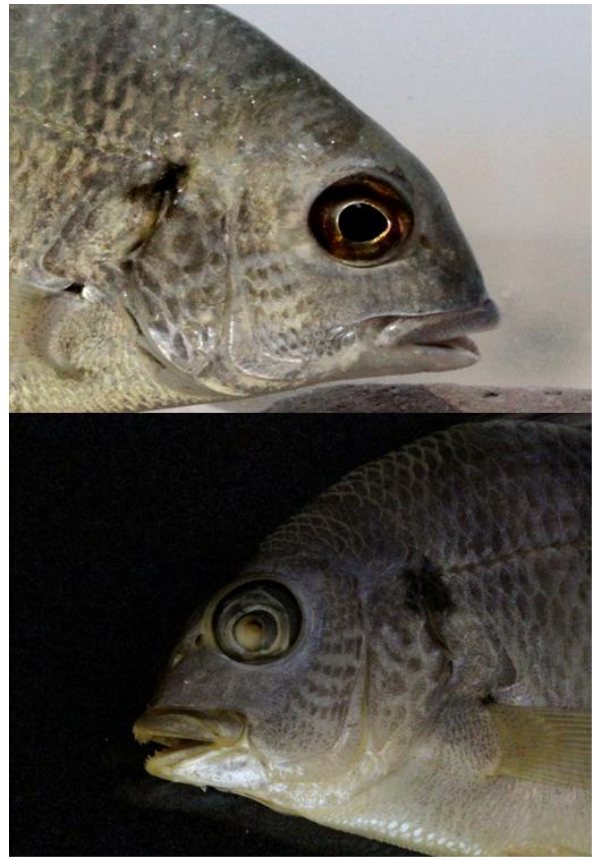


Fig.3. Head of *Acanthopagrus arabicus* from Shur River, South-East Iran at Strait of Hormuz.

analysis and the whole body was preserved in 10% formalin and was deposited in the Zoological Museum-Collection of the Biology Department of Shiraz University (ZM-CBSU). Methods for measurements and counts follow Hubbs & Lagler (1958) and Iwatsuki & Carpenter (2006). Distribution range of *Acanthopagrus* in Iran based on available published data is also given (Fig. 1).

Results and Discussion

Based on available published data and the present study it seems that *Acanthopagrus* populations are widely distributed in estuaries and rivers of coastal area of the Persian Gulf and Strait of Hormuz including the Arvand River (Shatt al Arab) in Iraq on the border with Khuzestan in Iran (Al-Hassan et al. 1989; Hussain et al. 1989; Saleh 2010; Taher 2010), Bahmanshir River (Marammazi 1995; Eskandary et al. 1999), Mahshahr creeks such as Jafari, Ghazaleh,



Fig.4. *Acanthopagrus arabicus* from Mond River (south-west, Iran) which drains to Persian Gulf



Fig.5. *Acanthopagrus arabicus* from Toola, Qeshm, Persian Gulf.

Majidieh Petroshimi and Zangi, (Savari et al. 2010; 2011; Movahedinia et al. 2010), Shadegan Wetland (Hashemi & Ansari 2012; Khaefi et al. 2014), Karun in Shushtar city (all in the northwest Persian Gulf), the Helleh and Mond Rivers in Bushehr Province (see Mostafavi et al. 2008; Coad 2014) and Shur River at Strait of Hormuz and Qeshm Island, Persian Gulf (Figs. 1&7). It seems that *Acanthopagrus arabicus* enters estuaries and may penetrate considerable distances into the inland waters with different habitat types. For example, at the first sampling site (Shur River), the habitat is over sand, mud with small gravel and boulders (Fig. 7). *Iranocichla hormuzensis* Coad, 1982 (Cichlidae), *Aphanius dispar* (Rüppell, 1829), *Aphanius furcatus* Teimori, Esmaeili, Erpenbeck & Reichenbacher, 2014 (Cyprinodontidae, see Teimori et al. 2014),

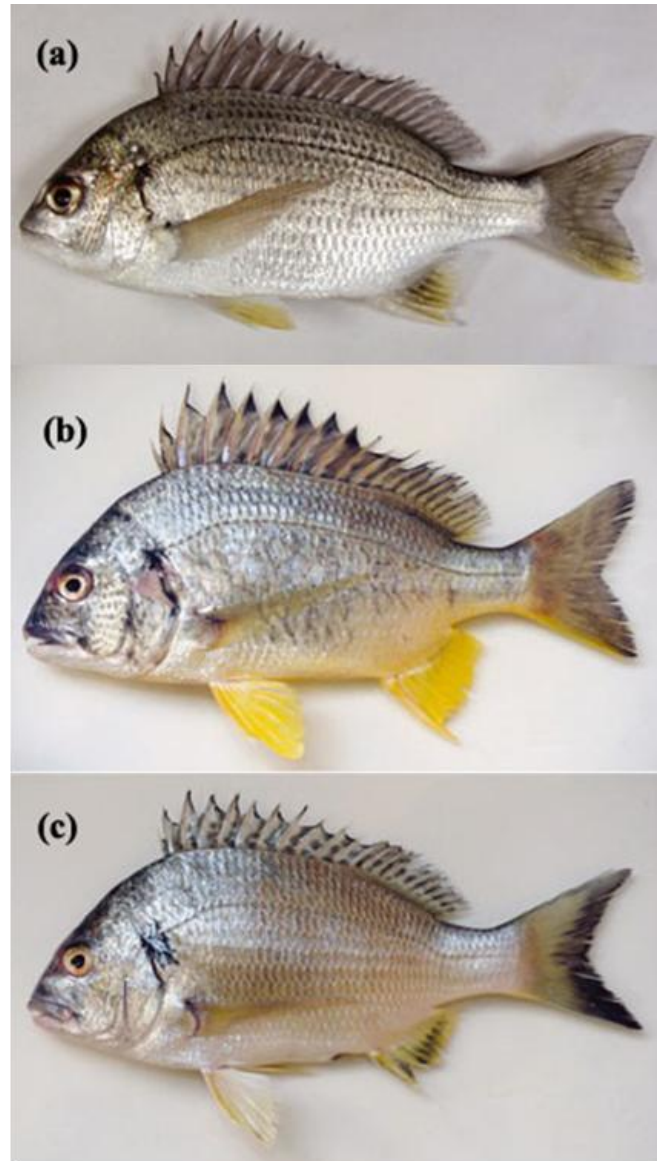


Fig.6. (a) Neotype of *Acanthopagrus latus*, MUFS 36814, 164mm standard length (LS), Nagasaki, Japan, (b) *Acanthopagrus arabicus* holotype, MUFS 33840, 165mm LS, western coast of Qatar and (c) *Acanthopagrus sheim*, holotype, MUFS 33838, 167 mm LS, off Hawar Islands, Qatar (Iwatsuki 2013).

Klunzinger's mullet, *Chelon klunzingeri* (Day, 1888) and *Chelon subviridis* (Valenciennes, 1836), were the other sympatric species with this sparid fish at Shur River.

Collected specimens show characteristics of the newly described sparid species, *Acanthopagrus arabicus* Iwatsuki, 2013 (Table 1, Figs. 2-5). Characteristics of the Shur River specimen are: body deep, 2.37; dorsal-fin rays XII, 10; 4 1/2 scale rows

Table 1. Meristic and morphometric characters for *Acanthopagrus arabicus*

Characters	Shur River	Qeshm Island	Holotype	Paratype
Dorsal-fin rays	XII, 11	XI, 12 or XII,	XI, 11	XI, 11 or XII, 10
Anal-fin rays	III, 8	III, 8	III, 8	III, 8
Pectoral-fin rays	15	15	15	14 – 15
Pelvic-fin rays	I, 5	I, 5	I, 5	I, 5
Pored lateral-line scales	45	46	42	42 – 45
Scales above/below lateral line	5 ½-10 ½	5 ½-10 ½	5 ½-12 ½	4 ½-5½-10 ½-12 ½
Scales from fifth dorsal spine base to lateral	4 ½	4 ½	4 ½	4 ½
Scales from ninth dorsal spine base to lateral	4 ½	4 ½	4 ½	4 ½
Scale rows on cheek	5	5	7	5 – 7
Gill rakers	10	5-6+1+9-	6+ 1 + 11 =	5 – 6+ 1 + 8–9 = 14–16
SL(mm)	84.35	159-196	165	56 – 259
Proportions*				
Body depth (D B)	42	40-43 (41)	45	42 – 49 (45)
Body depth at first anal-fin spine origin	34	33-38 (35)	38	38 33 – 40 (37)
Head length	31	30-34 (32)	36	32 – 35 (34)
Body width at pectoral-fin base	15	15-19 (18)	16	15 – 20 (18)
Snout length	12	11-14 (12)	14	10 – 13 (12)
Orbit diameter	9	6-8 (7)	9	8 – 12 (9)
Dermal eye opening	11	7-9 (8)	8	7 – 10 (8)
Bony interorbital width	9	8-9 (9)	10	8 – 10 (9)
Membrane interorbital	9	10-12 (10)	11	10 – 14 (11)
Upper-jaw length	13	11-15 (13)	14	12 – 14 (13)
Caudal-peduncle depth	13	11-12 (12)	13	11 – 14 (13)
Caudal-peduncle length	20	19-23 (20)	18	17 – 21 (19)
Predorsal length	45	40-45 (42)	46	41 – 46 (43)
Preanal length	70	67-73 (69)	65	65 – 75 (68)
Prepelvic length	38	37-40 (38)	39	36 – 41 (39)
Dorsal-fin base	55	53-57 (55)	59	56 – 61 (58)
Anal-fin base	16	16-17 (16)	17	16 – 18 (17)
Caudal-fin length	25	21-28 (23)	30	26 – 33 (29)
Pelvic-fin spine	18	15-25 (17)	18	15 – 18 (17)
First pelvic-fin ray	23	16-25 (21)	27	19 – 26 (23)
Pectoral-fin ray	35	30-37 (34)	40	35 – 41 (38)
First dorsal-fin spine	7	5-7 (6)	8	5 – 10 (7)
Second dorsal-fin spine	11	10-12 (11)	15	8 – 15 (12)
Third dorsal-fin spine	15	14-16 (15)	21	13 – 20 (17)
Fourth dorsal-fin spine	17	14-17 (16)	20	14 – 22 (19)
Fifth dorsal-fin spine	18	15-16 (16)	20	16 – 20 (18)
Sixth dorsal-fin spine	16	14-16 (15)	18	15 – 20 (18)
Last dorsal-fin spine	9	9-12 (10)	13	11 – 15 (12)
Longest dorsal-fin ray	12	9-12 (11)	12	11 – 15 (13)
First anal-fin spine	7	5-6 (6)	6	5–9 (6)
Second anal-fin spine	18	17-21 (19)	22	18 – 24 (21)
Third anal-fin spine	13	12-13 (12)	16	14 – 16 (15)
First anal-fin ray	12	10-12 (11)	17	13 – 17 (5)
Suborbital width	7	13-14 (13)	6	4 – 6 (5)
Posteriormost jaw width	12	12-15 (13)	12	11 – 14 (13)
2AS/3AS**	1.38	1.49-1.72	1.34	1.31 – 1.98 (1.53)
LS: D B	2.37	2.31-2.59	2.24	2.03 – 2.38 (2.21)

* Measurements expressed as percentages of standard length (SL).

**Second anal-fin spine length/third anal-fin spine length (abbreviated as 2AS/3AS).

between fifth dorsal-fin spine base and lateral line; 4 ½ scale rows above lateral line, 12 ½ scale rows

below; second anal-fin spine 18.3% of SL, 1.38 in 2AS/3AS; pored lateral-line scales 45; first soft



Fig.7. Natural habitat of *Acanthopagrus arabicus* from Shur River at Strait of Hormuz.

dorsal-fin ray slightly longer than last dorsal-fin spine; pelvic and anal fins vivid or strong yellow, lower caudal-fin lobe yellow; black streaks proximally on inter-radial membranes between yellow anal-fin rays absent; clear black blotches absent just beneath inter-radial membranes between dorsal-fin rays but upper dorsal-fin membrane with darker margin; weak diffuse dark blotch at origin of lateral line, covering first pored lateral-line scale, continuing as a dense dark shading over upper part of posterior opercle. Four transverse rows of scales on the cheek (Figs. 2, 3).

Dorsal fin spines strong, fourth longest; first anal-fin spine clearly shorter than orbit diameter; second anal-fin spine slightly longer than longest (fourth) dorsal-fin spine; third anal-fin spine shorter than second spine, shorter than snout length; pectoral fin tip nearly reaching level with first anal fin spine base vertically, its length greater than head length; first pelvic-fin ray length clearly greater than second anal fin spine; pelvic-fin spine longer than snout length. Morphometric and meristic characteristics of collected specimens from Qeshm Island area are given in Table 1 which fit within those of *A. arabicus* (Fig. 5).

This Middle Eastern species has long been identified as *A. latus* (Iwatsuki, 2013). However it can be distinguished from *A. latus* from East Asian shelf (Fig. 6a, by absence of black streaks proximally on the inter-radial membranes between the yellow anal-

fin rays (Fig. 6b). *Acanthopagrus arabicus* may also be confused with *A. sheim* (another species of yellowfin sparid fish in the area) in having yellow anal fins (Fig. 6c). *Acanthopagrus arabicus* differs from *A. sheim* in having lower counts of pored lateral-line scales (42–45, mode 43 in *A. arabicus* vs. 43–47, mode 45 in *A. sheim*) and no black blotches on the lower inter-radial membranes between the dorsal-fin rays (vs. two black blotches, rarely irregularly three, in *Acanthopagrus sheim*) (see Iwatsuki 2013).

Molecular and ecological studies of different *Acanthopagrus* populations in the coastal area of Persian Gulf and Strait of Hormuz are highly recommended.

Acknowledgment

We are thankful to Y. Iwatsuki for verification of *Acanthopagrus arabicus*, A. Gholamifard, N. Shaabani, M. Momeni, U. Schliwen, S. Ranjbar for helping in fish collection, H. Hashemi from Environment Department of Hormuzgan Province, M. Dakhte from Environmental Management Office, Qeshm Island, Hurmozgan, M. Safai from Hormuzgan University for coordination of field works and Shiraz University for financial support.

References

- Al-Hassan, L.A.J.; Hussain, N.A. & Soud, K.D. 1989. A preliminary, annotated check-list of the fishes of Shatt Al-Arab River, Basrah, Iraq. *Polskie Archiwum Hydrobiologii* 36(2): 283-288.
- Coad, B.W. 2014. Freshwater fishes of Iran. www.briancoad.com.
- Eschmeyer, W.N. & Fong, J.D. 2011. Pisces. In: Zhang, Z.-Q. (Ed.). *Animal biodiversity: An outline of higher level classification and survey of taxonomic richness*. *Zootaxa* 3148: 26-38.
- Eskandary, G.; Safeikhani, H. & Ghofleh Maramazi, J. 1999. Ichthyofauna and some biological indices in Karoon, Dez and Bahmanshir rivers (southwest of Iran). *Iranian Journal of Fisheries Sciences* 8(3): 23-36, 2-3. In Farsi.

- Esmaeili, H.R.; Coad, B.W.; Gholamifard, A.; Nazari, N. & Teimory, A. 2010. Annotated checklist of the freshwater fishes of Iran. *Zoosystematica Russica*. 19(2): 361-386.
- Hashemi S.A.R. & Ansary, H. 2012. Biomass and production of fish species in the Shadegan wetland, Iran. *Global Veterinaria* 9(2): 123-128.
- Hubbs, C.L. & Lagler, K.F. 1958. *Fishes of the Great Lakes Region*. University of Michigan Press.
- Hussain, N.A.; Ali, T.S. & Saud, K.D. 1989. Seasonal fluctuations and composition of fish assemblage in the Shatt Al-Arab at Basrah, Iraq. *Journal of Biological Sciences Research* 20(1): 139-150.
- Iwatsuki, Y. & Carpenter, K.E. 2006. *Acanthopagrus taiwanensis*, a new sparid fish (Perci formes), with comparisons to *Acanthopagrus berda* (Forsskal, 1775) and other nominal species of *Acanthopagrus*. *Zootaxa* 1202: 1-19.
- Iwatsuki, Y. 2013. Review of the *Acanthopagrus latus* complex (Perciformes: Sparidae) with descriptions of three new species from the Indo-West Pacific Ocean. *Journal of Fish Biology* 83: 64-95.
- Khaefi, R.; Esmaeili, H.R.; Zareian, H. & Babai, S. 2014. The first record of the redbelly tilapia, *Tilapia zillii* (Gervais, 1848), in freshwaters of Iran. *Turkish Journal of Zoology* 38: 96-98.
- Marammazi, G. 1995. Survey of the biology of *Tenuulosa ilisha*, southern Iran. *Aquaculture Fishery Research Centre, Iranian Fisheries Research and Training Organization, Ahvaz*. In Farsi.
- Mostafavi, H.; Kiabi B.; Abdoli A.; Mehrabin, A.R.; Ebrahimi, M.; Mahinu, A.S.; Kami, H.G.; Naqinezhad, A.; Delshab, H.; Moradi, A. & Bonegazim, B. 2008. Biodiversity of Mond Protected Area. Shadid Beheshti University, Tehran, Iran. In Farsi.
- Movahedinia, A.; Hedayati, A.; Safahieh, A. & Savari, A. 2010. Detection of some hormonal responses of yellowfin sea bream (*Acanthopagrus latus*) in Mahshahr Creeks (North West of Persian Gulf. *World Journal of Zoology* 6(1): 40-46.
- Saleh, S.M. 2010. Some Observations about Age and Growth of Shanag *Acanthopagrus latus* (Houttuyn) in Shatt Al-Arab River. *Nisan* 2(2): 65-71. In Arabic.
- Savari, A.; Hedayati, A.; Safahieh, A. & Movahedinia, A. 2010. Characterization of blood cells and hematological parameters of yellowfin sea bream (*Acanthopagrus latus*) in some creeks of Persian Gulf. *World Journal of Zoology* 6(1): 26-32.
- Savari, A.; Hedayati, A.; Safahieh, A. & Movahedinia, A. 2011. Determination of some enzymatic indices of yellowfin sea bream (*Acanthopagrus latus*) in Mahshahr Creeks (North West of Persian Gulf). *World Journal of Fish and Marine Sciences* 2(6): 475-480.
- Taher, M.M. 2010. Specialization, trophic breadth and diet overlap of thirteen small marine fish species from Shatt Al-Basrah Canal, Southern Iraq. *Marsh Bulletin* 5(2): 118-131.
- Teimori, A.; Esmaeili, H.R.; Erpenbeck, D. & Reichenbacher, B. 2014. A new and unique species of the genus *Aphanius* Nardo, 1827 (Teleostei: Cyprinodontidae) from Southern Iran: A case of regressive evolution. *Zoologischer Anzeiger*, file:///D:/Published%20papers/dx.doi.org/10.1016/j.jcz.2013.12.001.